



# Fact Sheet

NPDES Permit Number: WA-003957-8  
Public Notice Date: October 25, 2002  
Public Notice Expiration Date: November 25, 2002  
Technical Contact: Kelly Huynh 206 553-8414 or  
1-800-424-4372 (within Region 10)  
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## **The U.S. Environmental Protection Agency (EPA) Proposes to Reissue a National Pollutant Discharge Elimination System (NPDES) Permit to:**

Microchip Technology Incorporated  
1111 39<sup>th</sup> Avenue  
Puyallup, WA 98374-2122

## **and the Puyallup Tribe proposes to Certify the Permit**

### **EPA Proposes NPDES Permit Reissuance**

EPA proposes to reissue a National Pollutant Discharge Elimination System (NPDES) permit to Microchip Technology Incorporated. The draft permit sets conditions on the discharge of pollutants from the facility to the Puyallup River. In order to ensure protection of water quality and human health, the permit places limits on the types and amounts of pollutants that can be discharged.

This fact sheet includes:

- information on public comment, public hearing, and appeal procedures
- a description of the current and proposed discharge
- a listing of past and proposed effluent limitations and other conditions
- a map and description of the discharge location
- detailed background information supporting the conditions in the draft permit

### **Puyallup Tribe Certification**

The Puyallup Tribe proposes to certify the NPDES permit for Microchip Technology Incorporated under section 401 of the Clean Water Act. The Tribe provided preliminary comments prior to the Public Notice which have been incorporated into the draft permit.



**Public Comment**

Persons wishing to comment on the draft permit or request a public hearing may do so in writing by the expiration date of the public notice. All comments must be in writing and include the commenter's name, address, and telephone number and either be addressed to the Office of Water Director at U.S. EPA, Region 10, 1200 6th Avenue, OW-130, Seattle, WA 98101; submitted by facsimile to (206) 553-0165; or submitted via e-mail to huynh.kelly@epa.gov. All comments should include a concise statement of the exact basis of any comment and the relevant facts upon which it is based.

After the comment period closes, and all significant comments have been considered, EPA's regional Director for the Office of Water will make a final decision regarding permit reissuance. If no comments are received, the tentative conditions in the draft permit will become final, and the permit will become effective upon reissuance. If comments are received, EPA will address the significant comments and reissue the permit. The permit will become effective 33 days after the issuance date, unless an appeal is filed with the Environmental Appeals Board within 30 days of the issuance date.

**Documents are Available for Review**

The draft NPDES permit and related documents can be reviewed or obtained by visiting or contacting EPA's Regional Office in Seattle between 8:30 a.m. and 4:00 p.m., Monday through Friday (See address below).

United States Environmental Protection Agency  
Region 10  
1200 Sixth Avenue, OW-130  
Seattle, Washington 98101  
(206) 553-0523 or 1-800-424-4372 (within Alaska, Idaho, Oregon and Washington)

The fact sheet and draft permit are also available at:

EPA Washington Operations Office  
300 Desmond Drive SE  
Lacey, WA 98503  
360 753-9080

Puyallup Tribe of Indians  
Environmental Department  
2002 28<sup>th</sup> Street  
Tacoma, WA 98404  
253-573-7851

For technical questions regarding the permit or fact sheet, contact Kelly Huynh at the phone numbers or email address at the top of this fact sheet. Those with impaired hearing or speech may contact a TDD operator at 1-800-833-6384. Ask to be connected to Kelly Huynh at the above phone numbers. Additional services can be made available to persons with disabilities by contacting Kelly Huynh.



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FOR MICROCHIP TECHNOLOGY INCORPORATED INC.

## LIST OF ACRONYMS

AML	Average monthly limit
BMP	Best management practices
BOD <sub>5</sub>	Five-day Biochemical oxygen demand
CFR	Code of Federal Regulations
cfs	Cubic feet per second
CWA	Clean Water Act
DMR	Discharge monitoring report
CV	Coefficient of variation
Ecology	Washington State Department of Ecology
EPA	United States Environmental Protection Agency
lb/day	Pounds per day
LTA	Long term average
MDL	Maximum daily limit or method detection limit
mgd	Million gallons per day
mg/l	Milligrams per liter
ng/l	Nanograms per liter
ml	Milliliters
MASCA	Matsushita Semiconductor Corporation of America
MCRT	Mean cell residence time
MOA	Memorandum of agreement
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and maintenance
RP	Reasonable potential
TMAH	Tetra-methyl ammonium hydroxide
TMDL	Total maximum daily load
TRCL	Total residual chlorine
TSD	<i>Technical Support Document for Water Quality-based Toxics Control</i> , (EPA 1991)
TSS	Total suspended solids
TTO	Total toxic organics
USGS	United States Geological Survey
WET	Whole effluent toxicity
WLA	Wasteload allocation
µg/L	Micrograms per liter

## BACKGROUND INFORMATION

### I. APPLICANT

Microchip Technology Inc.  
NPDES Permit No: WA-003957-8

Facility Location and Mailing Address:  
111139<sup>TH</sup> Avenue  
Puyallup, WA 98374-2122

Facility Contact: Mari Chesser, Senior Environmental Engineer (253) 841-6560

### II. FACILITY ACTIVITY

Microchip Technology Incorporated (Microchip) owns a semi-conductor manufacturing plant located on a 93-acre property in the South Hill area of Puyallup Washington (see figure, Appendix A). The plant has been dormant since September 1998 when its former owner, Matsushita Semiconductor Corporation of America (MASCA), ceased operations. Microchip purchased the facility in July 2000 and plans to use the facility to manufacture wafer-level semi-conductor devices. Wafer manufacturing processes include photolithography, etching, thin film deposition, diffusion and implant.

Microchip operates a wastewater treatment plant at the site to treat wastewater generated during the manufacturing process. Based on the application submitted by the discharger, the maximum daily design flow of the treatment and discharge system is 1.88 MGD. After treatment, wastewater flows through a four-mile long dedicated pipe-line to the City of Puyallup Wastewater Treatment Plant (see figure, Appendix A). There, Microchip's wastewater merges with the City's treated wastewater and both discharge through the City's diffuser to the Puyallup River at River Mile 6.85.

### III. RECEIVING WATER

Microchip discharges to the Puyallup River at river mile 6.85 (latitude 47° 12' 25" N, longitude 122° 19' 15" W). This segment of the river is part of the trust property on the Puyallup Tribe of Indians' Reservation.

The Tribe sets water quality standards for waters of the Reservation under authority delegated by EPA. The Puyallup Tribe's standards designate beneficial uses for these waters. The Puyallup River is designated as Class A in the vicinity of the outfall (See Section 11 of Puyallup Tribes Water Quality Standards). Characteristic uses include the following: domestic, industrial and agricultural water supply, stock watering, fish and shellfish (including salmonids, crustaceans and other shellfish, and other fish), wildlife habitat, ceremonial and religious water use, commerce, navigation, and primary and secondary recreation.

The lower Puyallup River is listed on Washington's 303(d) list (a list of impaired waters compiled under section 303(d) of the Clean Water Act) as not meeting standards for dissolved oxygen. To address this problem, the Washington Department of Ecology (Ecology) established a seasonal preventative total maximum daily load (TMDL) for ammonia and 5-day biochemical oxygen demand (BOD<sub>5</sub>) throughout the Puyallup River basin and tributaries effective May 1 through October 31. This TMDL allocated the reserve capacity for BOD and ammonia and was used in establishing mass limits for BOD<sub>5</sub> and ammonia in the draft permit. Section IV of Appendix C discusses how the TMDL was incorporated into this permit.

#### **IV. FACILITY BACKGROUND**

##### **A. Treatment System**

Microchip combines wastewater from numerous manufacturing stations into nine streams for treatment (Appendix B). The nine wastewater streams are named:

1. Acid Waste
2. Phosphoric Acid
3. Chemical-Mechanical Planerization Slurry (CMP)
4. Fluoride-Phosphorus Ammonia (FPA)
5. Buffered Oxide Etch (BOE)
6. Chemical-Mechanical Planerization Post-Clean (CMP Post Clean)
7. Solvent Rinse (SOLR)

There are also several smaller miscellaneous flow streams and a Reverse Osmosis/Ultra filter/Sand Filter Reject (RP/UF/SF) stream from the source water treatment process

The treatment system was installed by MASCA and is available for use upon

manufacturing start-up. After start-up, Microchip will add the following treatment system processes to ensure effluent quality:

- MBR (membrane bioreactor) for SOLR Stream. On start-up, the SOLR stream will be treated using an existing activated sludge plant. Microchip will construct the membrane bioreactor during low-flow manufacturing start-up operations.
- GAC (Granulated Activated Carbon) Filtration, Final pH Adjustment, Filtration. Microchip will install these elements in phases as wastewater flows increase with increased production.
- MDR (Monitor, Divert, Reprocess). The MDR system will allow Microchip to continually monitor its waste streams, divert flows that do not meet effluent limits to temporary storage, and reprocess these flows through the treatment plant.

Microchip's December 2001 Engineering Report contains a complete description of the treatment processes, planned improvements, and unit process specifications.

Solids generated at the wastewater treatment plant are tested for chemical contaminants and disposed of at permitted waste handling facilities.

#### B. Permit Status

On June 30, 1994, the Ecology issued a National Pollutant Discharge Elimination System (NPDES) permit to MASCA. The permit established effluent limitations for pH, BOD<sub>5</sub>, Total Suspended Solids (TSS), Fluoride, Phosphorus, Ammonia, Total Residual Chlorine (TRCl), Total Toxic Organics(TTO), Mercury, and Whole Effluent Toxicity (WET- acute and chronic).

In 1997, EPA, the Puyallup Tribe, and Ecology signed a memorandum of agreement (MOA) regarding implementation of the NPDES permit program on the Puyallup Reservation. The MOA recognized that the federal government has the authority to issue NPDES permits for discharges to waters of the Reservation. In addition, the MOA stipulated that Ecology would provide technical review and permit preparation services for NPDES permits on the Reservation and that EPA would issue the permits. EPA issued MASCA an NPDES permit that year based upon Ecology's 1994 permit.

Microchip purchased the facility in July 2000 and submitted an application for permit renewal on January 24, 2002. This permit has been prepared jointly by EPA, Ecology, and the Tribe under the conditions of the MOA.

### C. Compliance Status

The previous owner (MASCA) generally reported compliance with its permit limitations during production. However, after shut down in September 1998 MASCA reported several violations of the mercury effluent limit during batch discharges of cooling water and stormwater. The EPA issued an administrative order containing a monetary penalty to MASCA in 2000 due to these violations and the failure to implement adequate corrective actions in a timely manner. Microchip, the new owner, concluded that these dischargers were caused by mercury in the industrial grade sulfuric acid that MASCA used, and concentration of this mercury in slimes (in the tightline) and solids (in treatment filters). Microchip cleaned the plant and tightline after purchase and switched to higher quality laboratory grade sulfuric acid. Table 1 summarizes violations between January 1996 and December, 2001. Whole Effluent Toxicity Compliance is discussed in Section VI.C.

Table 1: Effluent Limit Violations, Jan. '96 to Dec. '01		
Year	Parameter	# of Violations
1996	No Violations	0
1997	Ammonia	2
1998	Ammonia	2
	Total Suspended Solids	2
	Mercury	1
1999	Mercury	1
2000	Mercury	3
2001	No Violations	0

## V. EFFLUENT LIMITATIONS

The EPA, Ecology and the Tribe followed the Clean Water Act (CWA), Tribal and federal regulations, and EPA's 1991 *Technical Support Document for Water Quality-Based Toxics Control* (TSD) to develop the proposed effluent limits. In general, the CWA requires that the effluent limits for a particular pollutant be the more stringent of either the technology-based or water quality-based limits. However, the Puyallup Tribe's water quality standards also consider the facility's current performance. Appendix C provides the basis for the development of the proposed effluent limits.

Technology-based limits are set based on the level of treatment that is achievable using readily available technology. For semi-conductor manufacturing facilities, federal regulations (40 CFR 469.14 & 15) include technology-based limits for three parameters: TTOs, Fluoride, and pH. EPA also considered performance-based limits as categorical limits do not exist for most of the pollutants in Microchip's discharge, and such limits that do exist, promulgated in 1983, likely do not reflect current practice at this site or in the industry. Appendix C provides the basis for the development of performance-based effluent limits.

The EPA evaluates the technology-based limits and performance-based limits to determine whether they are adequate to ensure that water quality standards are met in the receiving water. If the limits are not adequate, EPA must develop additional water quality-based limits. These limits are designed to prevent exceedences of the Puyallup Tribe's water quality standards in the Puyallup River. The draft permit includes water quality-based limits for total ammonia, total residual chlorine, temperature, and mercury. Appendix D provides an example calculation for development of a water quality-based permit limit.

Table 2 compares the limits in the 1994 permit with those in the draft permit.

In addition to the limits for specific parameters in Table 2, the draft permit prohibits the discharge of waste streams that are not part of the normal operation of the facility, as reported in the permit application. The draft permit also requires that the discharge be free from floating, suspended, or submerged matter in concentrations that cause/may cause a nuisance.

Table 2: Microchip Effluent Limits Comparison				
Parameter	Average Monthly Limit		Maximum Daily Limit	
	Draft	1994	Draft	1994
BOD <sub>5</sub> mg/l	14	7-15 <sup>1</sup>	28	13-30 <sup>1</sup>
lb/day	88	88	175	175
TSS mg/l	11	15	23	30
lb/day	172 <sup>2</sup>	88-200	360 <sup>2</sup>	175-400
Ammonia mg/l	6	15	12	30
lb/day	147	147	240	240
Phosphorus, mg/l	1	3	3	5

Fluoride, mg/l	13	16	20	26
Temperature, °C	24	---	48	---
TRCL, µg/l	17 <sup>3</sup>	---	34 <sup>3</sup>	50
TTO, mg/l	1.37 mg/L	---	1.37 mg/l	Waiver
Arsenic, µg/l	0.018	---	0.05	---
Mercury, ng/l	---	---	80 <sup>4</sup> 49 <sup>5</sup> w/ sunset	80
PH, s.u.	---	---	6.2-9 <sup>6</sup>	6-9
Flow, MGD	---	0.7-1.6 <sup>1</sup>	1.88	0.98-1.88 <sup>1</sup>
<p><b>Notes</b></p> <ol style="list-style-type: none"> <li>1. The 1994 permit contained a range of effluent limits for BOD<sub>5</sub>. At low flows, the permit allowed a higher discharge concentration since more dilution was available, while at higher flows it required that concentrations decrease. The “sliding scale” was largely redundant because irrespective of the lower concentration (mg/L) limits, the discharger had to decrease the BOD<sub>5</sub> concentration in its discharge as flows increased or it would violate the load (lbs/day) limit. The draft permit eliminates the confusing and redundant sliding scale. As a result, it may appear that the new permit authorizes higher concentrations of BOD in the effluent, but it does not.</li> <li>2. These limits are based upon a discharge at the concentration-based limits and a flow of 1.88 MGD. They are slightly reduced from the existing mass limits that are based upon the existing concentration-based limits and actual flow.</li> <li>3. The effluent limit for total residual chlorine is not quantifiable using EPA approved test methods. Therefore, the EPA will use the minimum level (ML) of 100 µg/L as the compliance evaluation level.</li> <li>4. The effluent limit applies from the effective date of the permit to six (6) months from the effective date of the permit.</li> <li>5. The effluent limit applies from seven (7) months from the effective date of the permit unless the sunset provisions are met.</li> <li>6. The draft permit requires that pH be within the specified range of 6.2 to 9 at all times</li> </ol>				

## VI. MONITORING REQUIREMENTS

### A. Effluent Monitoring

Section 308 of the Clean Water Act and federal regulation 40 CFR 122.44(i)

require that monitoring be included in permits to determine compliance with effluent limitations. Monitoring may also be required to gather data for future effluent limitations or to monitor effluent impacts on receiving water quality. Microchip is responsible for conducting the monitoring and for reporting results to EPA and the Puyallup Tribe on Discharge Monitoring Reports (DMRs). The DMRs shall include laboratory analytical results and a summary of the data with respect to effluent limits, complete with data qualifiers (as necessary).

Table 3 compares the proposed monitoring requirements in the draft permit to those in the 1994 permit. Monitoring frequency is based on the minimum sampling necessary to adequately monitor the facility's performance as well as the monitoring requirements in the 1994 permit.

Table 3: Microchip Monitoring Requirements		
Parameter	Draft Sample Frequency	1994 Sample Frequency
Flow	Continuous	Continuous
pH	Continuous	Continuous
BOD <sub>5</sub>	1/Week	1/Week
TSS	1/Week	1/Week
Ammonia	1/Week	1/Week
Phosphorus	1/Week	1/Week
Fluoride	1/Week	1/Week
TRCL	1/Week	1/Week
Temperature	Continuous	1/Week
Arsenic	1/Week	---
Mercury	1/Month <sup>1</sup> 2/Week <sup>2</sup>	1/Month

MCRT	1/Month	1/Month
WET (chronic)	1/Quarter	1/Quarter
TTO	1/year <sup>3</sup>	1/Quarter in Fourth Year
Notes 1. Sampling for Mercury shall be once per month for the duration of the permit unless Microchip intends to determine compliance with the sunset provisions in the permit at which time twice weekly monitoring is required. 2. If the permittee intends to comply with the sunset provisions, monitoring shall occur twice weekly beginning 7 months from the effective date of the permit. 3. Effluent monitoring result(s) shall be reported with the January DMR.		

#### B. Method Detection Limits

The draft permit requires that Microchip use an EPA-approved method with an method detection limit (MDL) 0.1 times the effluent limitation or the most sensitive EPA-approved method, whichever is greater. This provision ensures that, to the extent possible, data can be used to accurately determine compliance with permit limits without imposing an undue burden on the discharger where a less sensitive method will give accurate data.

#### C. Whole Effluent Toxicity

Federal regulations at 40 CFR 122.44(d)(1) require that permits contain limits on WET when a discharge has reasonable potential to cause or contribute to an exceedence of a water quality standard. Section 5, paragraphs 1 and 2 of the Puyallup Tribe of Indians Water Quality Standards prohibit the discharge of toxic substances in toxic amounts and require that toxicity testing be used to determine compliance with this prohibition.

Whole effluent toxicity tests are laboratory tests that replicate to the greatest extent possible the total effect and actual environmental exposure of aquatic life to effluent toxicants without requiring the identification of specific toxicants. Whole effluent toxicity tests use small vertebrate and invertebrate species and/or plants to measure the aggregate toxicity of an effluent. There are two different durations of toxicity test: acute and chronic. Acute toxicity tests measure survival over a 96-hour exposure. Chronic toxicity tests measure reductions in survival, growth, and reproduction over a 7-day exposure.

Microchip is one of only two dischargers in the state (the other being the City of Puyallup) that has conducted toxicity testing using coho salmon and rainbow trout in 14-day, flow-through, onsite tests. While exposure concentrations during tests were lower than exposures used in acute and chronic testing, durations were longer and survival was at or near 100% in these tests.

There have been no episodes of acute toxicity in the discharge since 1995. As a result, the draft permit does not require acute testing as there appears to be no reasonable potential to violate acute toxicity effluent limits. The permit does require Microchip to test for chronic toxicity on a semi-annual basis. Despite the flow through test results, there has been evidence in past five years of chronic toxicity in the discharge.

#### D. Ambient Sampling

Receiving water monitoring is needed to evaluate if the effluent is causing or contributing to an instream excursion of the water quality criteria. The permittee must use test methods that achieve the same MDLs as are necessary for effluent sampling for total ammonia, total residual chlorine, mercury and temperature. To the extent practicable, surface water sample collection must occur on the same day as effluent sample collection and during low river flow conditions. The proposed receiving water monitoring requirements for the draft permit are provided in Table 4.

Consistent with the Puyallup Tribe's water quality standards for mixing zones the maximum size shall comply with the following:

- Not extend in a downstream direction for a distance from the discharge port greater than three hundred feet plus the depth of water over the discharge ports or extend upstream for a distance of over one hundred feet.
- Not utilize greater than twenty-five percent of the river flow.

<b>Table 4: Receiving Water Monitoring Requirements in the Puyallup River</b>			
<b>Parameter</b>	<b>Location</b>	<b>Sample Frequency</b>	<b>Sample Type</b>
Temperature, EC	Downstream edge of mixing zone	1/year	Grab
Total Ammonia as N, mg/L	Downstream edge of mixing zone	1/year	Grab
Total Residual Chlorine, mg/L	Downstream edge of mixing zone	1/year	Grab
Mercury, ng/L	Downstream edge of mixing zone	1/year	Grab

#### E. Representative Sampling

The draft permit has expanded the requirement in the federal regulations regarding monitoring (40 CFR 122.41[j]). This provision now specifically requires representative sampling whenever a bypass, spill, or non-routine discharge of pollutants occurs, if the discharge may reasonably be expected to cause or contribute to a violation of an effluent limit under the permit. If such a discharge occurs, Microchip must conduct additional, targeted monitoring to quantify the effects of the discharge on the final effluent. This provision is included in the draft permit because routine monitoring could easily miss permit violations and/or water quality standards exceedences that could result from bypasses, spills, or non-routine discharges.

#### F. Total Toxic Organics

A narrative statement must be submitted with each discharge monitoring report certifying that:

“Based on my inquiry of the persons directly responsible for managing compliance with the permit limitation for total toxic organics, I certify that, to the best of my knowledge and belief, no dumping of concentrated toxic organics into the wastewaters has occurred since filing the last discharge monitoring report. I further certify that this facility is implementing the solvent management plan submitted to and approved by EPA.”

## VII. OTHER PERMIT REQUIREMENTS

### A. Wastewater Treatment System Operating Plan (WWTSOP)

Microchip will prepare a Wastewater Treatment System Operating Plan as an umbrella document for the various plans required under this permit. A copy shall be provided to the Tribe's Environmental Protection Department upon completion.

### B. Quality Assurance Plan

Federal regulations at 40 CFR 122.41(e) require permittees to properly operate and maintain their facilities, including "adequate laboratory controls and appropriate quality assurance procedures." To implement this requirement, the draft permit requires that Microchip develop a Quality Assurance Plan to ensure that monitoring data are accurate and to explain data anomalies if they occur. Microchip is required to implement the plan within **120 days of the effective date** of the draft permit. The Quality Assurance Plan must include standard operating procedures Microchip must follow for collecting, handling, storing and shipping samples, laboratory analysis, and data reporting and be submitted to the Tribe's Environmental Protection Department for review **within 90 days of the effective date of the permit** for approval prior to sampling.

### C. Best Management Practices

Section 402 of the Clean Water Act and federal regulations 40 CFR 122.44(k)(2) and (3) authorize EPA to require best management practices, or BMPs, in NPDES permits. BMPs are measures for controlling the generation of pollutants and their release to waterways. These measures can be included in the facility's WWTSOP. These measures are important tools for waste minimization and pollution prevention.

The draft permit requires Microchip to incorporate appropriate BMPs into its WWTSOP within **180 days of permit issuance**. Specifically, Microchip must consider spill prevention and control and optimization of chemical use. To the extent that these issues have already been addressed, Microchip need only reference the appropriate document in its WWTSOP. The WWTSOP must be revised as new practices are developed.

As part of proper operation and maintenance, the draft permit requires Microchip to develop a revised facility plan or engineering report when the annual average

flow exceeds 85 percent of the design flow of the plant (1.88 MGD). This plan requires Microchip to develop a strategy for remaining in compliance with effluent limits in the permit.

The permit requires Microchip to develop Pollution Prevention Plans for Arsenic and Mercury to control the discharge of these two metals; and a Solvent Management Plan for the control of Total Toxic Organic Compounds. These plans shall be submitted to the Tribe's Environmental Protection Department by 18 months from the effective date of the permit and approved prior to implementation. The substitution of reagent grade chemicals for technical grade chemicals is approved on the effective date of the permit reissuance.

#### D. Fluoride Study

Microchip has the option of conducting one of the following two studies. Microchip will determine which option shall be included in the final permit by the end of the comment period.

Microchip will shall commence a study within the first 6 months of the effective date of the permit to study the alternate use of process chemicals that don't contain fluoride as an active ingredient. A report on the feasibility of alternate chemical use shall be submitted to the Tribe's Environmental Protection Department by the 12 month from the effective date of the permit. The feasibility report shall be reviewed and approved by the Tribe's Environmental Protection Department prior to implementation.

OR

If process chemicals that contain fluoride are used at the Microchip facility, a fluoride toxicity study shall be conducted to ensure compliance with Section 5(1) of the Water Quality Standards for Surface Waters of the Puyallup Tribe. Section 5(1) of the Tribe's Water Quality Standards state "Toxic substances shall not be introduced above natural background levels in surface waters of the Puyallup tribe which have the potential either singularly or cumulatively to adversely affect characteristic uses, cause acute or chronic conditions to the most sensitive biota dependent on those waters, or adversely affect public health, as determined by the Department." The study's scope and methods shall be approved by the Department within the first 6 months of the effective date of the permit, prior to commencing the study.

#### E. Discharge to City Sewer

The permit allows Microchip to divert its SOLR MBR effluent, non-process cooling tower blowdown, boiler blowdown, and UPW pretreatment train backwash and RO/UF reject streams, and certain effectively-pretreated, categorical process wastewater to the City sanitary sewer provided the effluent receives treatment no less than that described in the Engineering Report, Microchip submits plans for the diversion 30 days prior to diverting the flow, the City approves the discharge, and Microchip complies with monitoring and reporting requirements for the discharge.

#### F. Additional Permit Provisions

In addition to facility-specific requirements, portions of sections II, III, and IV of the draft permit contain “boilerplate” requirements. Boilerplate is standard regulatory language that applies to all permittees and must be included in NPDES permits. Because the boilerplate requirements are based on regulations, they cannot be challenged in the context of an NPDES permit action. The boilerplate covers requirements such as monitoring, recording, and reporting requirements, compliance responsibilities, and general requirements.

#### H. Compliance Schedule Reporting

The tribe has the option of providing compliance schedules through the 401 certification process for new water quality based effluent limits. If compliance schedules are provided, annual reporting demonstrating improvements towards achieving the final effluent limits will be included in the final permit.

### VIII. OTHER LEGAL REQUIREMENTS

#### A. Endangered Species Act

Section 7 of the Endangered Species Act requires federal agencies to consult with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) if the actions could beneficially or adversely affect any threatened or endangered species. EPA requested lists of threatened and endangered species from the NMFS and USFWS in letters dated December 10, 1999. In a letter dated January 24, 2000, the USFWS identified the Bald eagle (*Haliaeetus leucocephalus*) and Bull trout (*Salvelinus confluentus*) as threatened. In a phone call on December 16, 1999, the NMFS identified the Chinook salmon (*Oncorhynchus tshawytscha*) as threatened. Neither agency identified any proposed or candidate species.

The EPA has tentatively determined that issuance of the NPDES permit is **not likely to adversely affect** the bald eagle, chinook salmon, or the bull trout. A biological evaluation has been provided to the NMFS and USFWS for the bald eagle, bull trout, coho salmon, and the Puget Sound chinook salmon. The EPA has also provided copies of the draft permit and fact sheet. Any comments received from these agencies regarding this determination will be considered prior to reissuance of this permit.

Under the Magnuson-Stevens Fishery Conservation and Management Act, the NMFS and various fisheries management councils must identify and protect “essential fish habitat” for species managed under the Act. The NMFS and fisheries councils reviewed Microchips facilities planning documents for completeness. This facilities plan has since been approved. Any comments received from the NMFS regarding the finding of **no effect** on essential fish habitat will be considered prior to reissuance of this permit.

#### B. Tribal Certification

Section 401 of the CWA requires EPA to seek certification from the Tribe that the permit is adequate to meet Tribal water quality standards before issuing a final permit. The federal regulations allow for the Tribe to stipulate more stringent conditions in the permit, if the certification cites the CWA or Tribal law upon which that condition is based. In addition, the regulations require a certification to include statements of the extent to which each condition of the permit can be made less stringent without violating the requirements of Tribal law.

Part of the Tribe’s certification is authorization of a mixing zone. The draft permit contains a mixing zone for ammonia, mercury, temperature and chlorine based on the provisions in the Puyallup Water Quality Standards. If the Tribe authorizes a different mixing zone (or dilution) in its final certification, EPA will recalculate the effluent limitations based on the dilution available in the final mixing zone. If the Tribe does not certify the mixing zone, EPA will recalculate the permit limitations based on meeting water quality standards at the point of discharge. A preliminary 401 certification has been provided by the Puyallup Tribe has been provided in Appendix E.

#### C. Permit Expiration

This permit will expire **five years from the issuance date**.

## REFERENCES

40 CFR 469 Subpart A. *Effluent Guidelines and Standards, Electrical and Electronic Components Point Source Category, Semiconductor Subcategory.*

Brown and Caldwell. 2001. Engineering Report for Microchip Technology Incorporated, October 31, 2001.

EPA 1991. *Technical Support Document for Water Quality-based Toxics Control.* Office of Water Enforcement and Permits, Office of Water Regulations and Standards. Washington, D.C., March 1991. EPA/505/2-90-001.

Microchip Technology Incorporated. 2002. Renewal Application for NPDES Permit WA-0039578, January 24, 2002.

Washington State Department of Ecology, 1993. *Puyallup River Total Maximum Daily Load for Biochemical Oxygen Demand, Ammonia, and Residual Chlorine.* June 1993.

Washington State Department of Ecology, 1994. *Addendum to the 1993 Puyallup River TMDL Report.* July 1994.

## **APPENDIX A – MICROCHIP FACILITY LOCATION MAPS**

Source: Microchip Engineering Report



## **APPENDIX B – MICROCHIP WASTE STREAM SCHEMATICS AND FLOWS**

Source: Microchip Engineering Report



## **APPENDIX C - BASIS FOR EFFLUENT LIMITATIONS**

### **I. Statutory and Regulatory Basis for Limits**

Sections 101, 301(b), 304, 308, 401, 402, and 405 of the CWA provide the basis for the effluent limitations and other conditions in the draft permit. The EPA evaluates discharges with respect to these sections of the CWA and the relevant NPDES regulations to determine which conditions to include in the draft permit.

In general, the EPA first determines which technology-based limits must be incorporated into the permit. EPA then evaluates the effluent quality expected to result from these controls, to see if it could result in any exceedences of the water quality standards in the receiving water. If exceedences could occur, EPA must include water quality-based limits in the permit. The draft permit limits reflect whichever requirements (technology-based, water quality-based, or performance-based) are more stringent. A table of the limits that EPA is proposing in the draft permit is found in Section V of this fact sheet. This Appendix describes the technology-based, water quality-based, and performance-based evaluations for Microchip.

### **II. Technology-based Evaluation**

Section 301(b)(2) of the CWA requires technology-based controls on effluents. This section of the CWA requires that, by March 31, 1989, all permits contain effluent limitations which: (1) control toxic pollutants and nonconventional pollutants through the use of “best available technology economically achievable” (BAT), and (2) represent “best conventional pollutant control technology” (BCT) for conventional pollutants. In no case may BCT or BAT be less stringent than “best practicable control technology currently available” (BPT), which is a minimum level of control required by section 301(b)(1)(A) the CWA.

The effluent guidelines and standards for Electrical and Electronic Components manufacturing can be found in the Code of Federal Regulations (CFR) at 40 CFR Part 469 (Table C-1). Microchip is regulated under Subpart A (Semiconductor Subcategory). Section 469.15 of Subpart A establishes BAT for Fluoride and TTO. Section 469.14 of Subpart A establishes BPT for pH and TTO. To calculate effluent limitations, the annual average production is multiplied by the effluent guidelines. Section 469.19 of Subpart A establishes BCT for pH.

Table C-1 Technology-Based Effluent Limits for the Semiconductor Manufacturing Industry						
	BPT		BCT		BAT	
	Average Monthly Limit	Maximum Daily Limit	Average Monthly Limit	Maximum Daily Limit	Average Monthly Limit	Maximum Daily Limit
pH	6-9	6-9	6-9	6-9	---	---
Fluoride	---	---	---	---	17.4 mg/l	32 mg/l
TTO	---	1.37 mg/l	---	---	1.37 mg/l	---

## II. Performance-based Evaluation

Section 402(a) of the CWA allows EPA to incorporate into permits “such conditions as the Administrator determines are necessary to carry out the provisions of this Act.” EPA considered performance-based limits for this facility as technology-based limits, promulgated in 1983, probably do not reflect current practice in the industry. Performance-based maximum daily limits in this permit are set at the 99<sup>th</sup> percentile value of the discharger’s effluent data base. Performance-based average monthly limits in this permit are set at the 95<sup>th</sup> percentile value of the discharger’s average monthly effluent data base. These limits are set using the statistical procedures outlined in EPA’s *Technical Support Document for Water Quality-based Toxics Control*.

Table C-2 Performance-Based Effluent Limits for Microchip Technology Inc.		
	Average Monthly Limit (mg/l)	Maximum Daily Limit (mg/l)
BOD <sub>5</sub>	14	28
TSS	11	23
Fluoride	13	20
Phosphorus	1	3

### III. Water Quality-Based Evaluation

In addition to the technology-based and performance-based limits discussed above, EPA evaluated the discharge to determine compliance with Section 301(b)(1)(C) of the CWA. This section requires the establishment of limitations in permits necessary to meet water quality standards by July 1, 1977.

The regulations at 40 CFR 122.44(d)(1) implement section 301(b)(1)(C) of the CWA. These regulations require that NPDES permits include limits for all pollutants or parameters which “are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality.” These regulations also apply to Tribal water quality standards. The limits must be stringent enough to ensure that water quality standards are met, and must be consistent with any available wasteload allocation (WLA).

In determining whether water quality-based limits are needed and developing those limits when necessary, EPA uses the approach outlined below:

- a. Determine the appropriate water quality criteria
- b. Determine whether there is “reasonable potential” to exceed the criteria
- c. If there is “reasonable potential”, develop a WLA
- d. Develop effluent limitations based on the WLA

Appendix D provides example calculations for total ammonia to illustrate how these steps are implemented.

#### A. Determine Water Quality Criteria

The first step in developing water quality-based limits is to determine the applicable water quality criteria. The applicable criteria are determined based on the beneficial uses of the receiving water as identified in Section III of the Fact Sheet. For any given pollutant, different uses may have different criteria. To protect all beneficial uses, the permit limits are based on the most stringent of the water quality criteria applicable to those uses (See Table C-3).

#### B. Reasonable Potential Evaluation

To determine if there is “reasonable potential” to cause or contribute to an exceedence of the water quality criteria for a given pollutant, EPA compares applicable water quality criteria to the maximum projected downstream concentrations for a particular pollutant. If the projected downstream

concentration exceeds the criteria, there is “reasonable potential” and a water quality-based effluent limit must be included in the permit. Table C-3 summarizes the data, multipliers, and criteria used to determine “reasonable potential” to exceed criteria.

EPA used the recommendations in Chapter 3 of the *Technical Support Document for Water Quality-based Toxics Control* (TSD, EPA 1991) to conduct this “reasonable potential” analysis for Microchip. An example reasonable potential (RP) analysis for total ammonia is found in Appendix D.

The maximum projected downstream concentration,  $C_d$ , is determined using the following mass balance equation.

$$C_d = \frac{(C_e \times Q_e) + (C_u \times Q_u)}{Q_d}$$

where,

$C_d$  = receiving water concentration downstream of the effluent discharge (at the edge of the mixing zone)

$C_e$  = maximum projected effluent concentration  
maximum reported effluent value X reasonable potential multiplier

$Q_e$  = design flow

$C_u$  = upstream concentration of pollutant

$Q_u$  = upstream flow

$Q_d$  = receiving water flow downstream of the effluent discharge  
 $Q_e + Q_u$

Substituting the equality:

$$D = \frac{(Q_u + Q_e)}{Q_e}$$

where,

$D$  = dilution factor

the equation becomes:

$$C_d = \frac{(C_e - C_u)}{D} + C_u$$

Sections 1 through 4 below discuss each of the factors used in the mass balance equation to calculate  $C_d$ .



**Table C-3: Reasonable Potential Evaluation**

Parameter (note units)	Maximum Reported Conc.	Number of Samples	CV	Reasonable Potential Multiplier	Maximum Projected Effluent Conc. (C <sub>e</sub> )	Upstream Conc. (C <sub>u</sub> )	Projected Downstream Conc. (C <sub>d</sub> ) at Edge of MZ:		Criterion <sup>3</sup>	
							Acute	Chronic	Acute	Chronic
Ammonia, mg/l	26	54	0.58	1.65	43	0.05	<b>24<sup>2</sup></b>	<b>4<sup>2</sup></b>	6.7	1.5
Arsenic, Total µg/l	4.9	8	1.34	8.7	42.6	1.4	24 <sup>4</sup>	5 <sup>4</sup>	360 <sup>4</sup>	190 <sup>4</sup>
Mercury, ng/l	13	7	0.39	2.36	24	6.6 <sup>1</sup>	16	8	2100	12
Temperature, °C	23	46	0.6	1.76	40	15.3	NA	<b>17.5</b>	18°C and 16.5 (C <sub>d</sub> < 15.3 + 1.26 (=28/(C <sub>u</sub> +7)))	
Total Residual Chlorine, ug/l	40	44	0.43	1.76	46	0	<b>26<sup>2</sup></b>	4	19	11

**Footnotes**

- 1 Effluent and upstream concentrations for these metals are expressed as total recoverable metals.
- 2 The projected downstream concentration exceeds the criterion at the mixing zone boundary; therefore, a limit is needed.
- 3 Mercury criterion is for total mercury.
- 4 The background concentration of arsenic is greater than the human health criterion of 0.018 µg/L therefore a mixing zone is not available and the maximum downstream effluent concentration is 42.6 µg/L. This value is greater than the criterion and effluent limits are necessary.

## 1. Effluent Concentration

The maximum projected effluent concentration ( $C_e$ ) in the mass balance equation is based on the 99<sup>th</sup> percentile, calculated using the statistical approach recommended in the TSD. The 99<sup>th</sup> percentile effluent concentration is calculated by multiplying the maximum reported effluent concentration by a reasonable potential multiplier.

The reasonable potential multiplier accounts for uncertainty in the data. The multiplier decreases as the number of data points increases and variability of the data decreases. Variability is measured by the coefficient of variation (CV) of the data. When there are not enough data to reliably determine a CV, the TSD recommends using 0.6 as a default value. A partial listing of reasonable potential multipliers can be found in Table 3-1 of the TSD. See Table C-3 for a summary of maximum reported effluent concentrations, reasonable potential multipliers, and maximum projected effluent concentrations.

## 2. Upstream (Ambient) Concentration

The ambient concentration in the mass balance equation is based on a reasonable worst-case estimate of the pollutant concentration upstream from the Microchip's discharge. For criteria that are expressed as maxima (for example, mercury), the 95<sup>th</sup> percentile of the ambient data is generally used as an estimate of worst-case. For mercury, these percentiles were calculated using data developed by the USGS and the discharger. See Table C-3 for a summary of upstream concentrations for specific pollutants.

## 3. Dilution

Under the Tribe's water quality standards, dischargers are not authorized to use the entire upstream flow for dilution of their effluent. Instead, the standards contain the following restrictions on mixing zones for determining compliance with chronic criteria:

The size may be up to 300 feet plus the horizontal length of the diffuser downstream, 100 feet upstream, and 25 percent of the width of the river at the 7Q10 flow;<sup>1</sup> The mixing zone may not be more than 25 percent of the volume of the 7Q10 flow.

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<sup>1</sup> The 7Q10 (7-day, 10-year low flow) is the 7-day average low flow that has a 10 percent chance of occurring in any given year.

The maximum acute mixing zone is the same width and approximately 10 percent of the length of the chronic mixing zone. In addition, the acute mixing zone is limited to 10 percent of the volume of the chronic mixing zone, or 2.5 percent of the 7Q10 flow.

The effluent flow used to calculate the dilution is the design flow of the facility. For Microchip, the design flow is 1.88 million gallons per day (MGD).

Table C-4 shows the dilutions at the edge of the mixing zones calculated using the maximum allowable percentage of river flow under the Tribal standards and the 1994 and 2002 estimates of the 7Q10.<sup>2</sup>

<b>Table C-4 Dilution Factors and Flow Assumptions</b>				
	Microchip Discharge (MGD)	City Discharge (MGD)	River Flow (cfs)	Dilution Factor
Acute aquatic life	1.88	14.1	757	1.8
Chronic aquatic life	1.88	9.7	757	11.5

In accordance with the Puyallup Tribe's water quality standards, only the Tribe may authorize mixing zones. If the Tribe authorizes a different size mixing zone in its final 401 certification, EPA will recalculate the reasonable potential and effluent limits based on the final mixing zone. If the Tribe does

<sup>2</sup> The most recent estimates of the 7Q10 for the Puyallup River at Puyallup gage put the flow in the range of 730-750 cfs, compared to 757 cfs calculated in 1994. The best estimate appears to be at the lower end, 731 cfs. However, the effect on dilution factors and effluent limits of this change in 7Q10 is small for the 1.88 MGD design condition. As a result, we used the dilution factors contained in Microchip's engineering report to calculate effluent limits for flows up to 1.88 MGD.

#### Dilution Factors and Effluent Limits for Microchip Discharge of 1.88 MGD

	7Q10 = 757 cfs	7Q10 = 731 cfs
Acute Dilution Factor	1.8	1.74
Chronic Dilution Factor	11.5	11.2
Ammonia MDL Limit (ug/l)	12	12
Ammonia AML Limit (ug/l)	6	6
TRCL MDL Limit (ug/l)	34	33
TRCL AML Limit (ug/l)	17	17
Mercury RP Trigger (ng/l)	49	48

not authorize a mixing zone in its 401 certification, EPA will recalculate the limits based on meeting water quality criteria at the point of discharge.

### C. Wasteload Allocation Development

Once EPA has determined that a water quality-based limit is required for a pollutant, the first step in developing a permit limit is development of a wasteload allocation (WLA) for the pollutant. A WLA is the concentration (or loading) of a pollutant that the permittee may discharge without causing or contributing to an exceedence of water quality standards in the receiving water. WLAs for this permit were calculated based on a mixing zone for ammonia and total residual chlorine, and a TMDL for BOD<sub>5</sub>.

#### 1. Mixing zone-based WLA

Where the Tribe authorizes a mixing zone for the discharge, the WLA is calculated as a mass balance, based on the available dilution, background concentrations of the pollutant(s), and the water quality criteria. The mass balance equation is the same as that used to calculate reasonable potential, with the acute or chronic criterion substituted for  $C_d$  and the WLA substituted for  $C_e$ .

Because acute aquatic life, chronic aquatic life, and human health criteria apply over different time frames and may have different mixing zones, it is not possible to compare them directly to determine which criterion results in more stringent limits. For example, the acute criteria are applied as a one-hour average and have a smaller mixing zone, while the chronic criteria are applied as a four-day average and have a larger mixing zone. To allow for comparison, the acute, chronic, and human health WLAs are statistically converted to long-term average WLAs. The most stringent long-term average WLA resulting from these conversions is used to calculate the permit limits.

#### 2. TMDL-based WLA

Where the receiving water quality does not meet water quality standards, the WLA is generally based on a TMDL developed by the state or EPA. A TMDL is a determination of the amount of a pollutant, from point, nonpoint, and natural background sources, including a margin of safety, that may be discharged to a water body without causing the water body to exceed the criterion for that pollutant. Any loading above this capacity would violate water quality standards.

Section 303(d) of the CWA requires states to develop TMDLs for waterbodies that will not meet water quality standards after the imposition of technology-

based effluent limitations, to ensure that these waters will come into compliance with water quality standards.

The first step in establishing a TMDL is to determine the assimilative capacity (the loading of pollutant that a water body can assimilate without exceeding water quality standards), accounting for seasonal variation, if appropriate. The next step is to divide the assimilative capacity into allocations for non-point sources (called load allocations), point sources (called WLAs), natural background loadings, and a margin of safety to account for any uncertainties. Permit limitations are then developed for point sources that are consistent with the WLAs.

See section IV.A of this Appendix for information on the TMDL used to derive the limits in the draft permit for BOD<sub>5</sub> and ammonia.

#### D Permit Limit Derivation

For mixing-zone based WLAs, EPA applied the statistical permit limit derivation approach described in Chapter 5 of the TSD to obtain daily maximum and monthly average permit limits. This approach takes into account effluent variability (through the CV), sampling frequency, and the difference in time frames between the monthly average and daily maximum limits.

The daily maximum limit is based on the CV of the data and the probability basis, while the monthly average limit is dependent on these two variables and the monitoring frequency. As recommended in the TSD, EPA used a probability basis of 95 percent for monthly average limit calculation and 99 percent for the daily maximum limit calculation. EPA assumed a CV of 0.6 for both monthly average and daily maximum calculations. Appendix D provides an example permit limit calculation.

For the TMDL-based limits, EPA used the maximum load established under the TMDL (WLA), and the average load agreed to by MASCA, as load based permit limits.

#### E. Antidegradation

In addition to water quality-based limitations for pollutants that could cause or contribute to exceedences of numeric or narrative criteria, EPA must consider the Tribe's antidegradation policy. This policy is designed to protect existing water quality when it is better than that required to meet the standard. In addition, when the existing quality is at the level of the standard, the

antidegradation policy prevents water quality from being degraded below the standard when existing quality.

For waters that are at the level of the standard (known as "Tier 1" waters), the antidegradation policy requires that water quality standards continue to be met. For waters with better quality than the standards (known as "high quality" or "Tier 2" waters), antidegradation requires that no lowering of water quality be allowed unless the Tribe finds that allowing lower water quality is necessary to accommodate important economic or social development before any lowering of water quality is authorized. The Tribe may also designate waters as "Tier 3," in which case no lowering of water quality is allowed.

The Tribe has no implementation guidance for their antidegradation policy. Therefore, the Puyallup River in the vicinity of the discharge has not been assigned to any tier. However, the limits in the permit ensure that uses are protected and water quality standards are met.

#### IV. Pollutant-specific Analysis

This section outlines the basis for each of the effluent limitations in Microchip's draft permit.

##### A. Biochemical Oxygen Demand

The draft permit contains performance-based limits that reduce the maximum daily limit from 30 mg/l to 28 mg/l and the average monthly limit from 15 mg/l to 14 mg/l (Table C-5). The permit retains the existing mass limits. The mass limits are based upon a TMDL (maximum load) and a previous commitment to not increase loadings (average load).

Table C-5: BOD Limits				
	Concentration (mg/l)		Loading(lb/day)	
	Draft	Existing	Draft	Existing
Average Monthly	14	15	88	88
Maximum Daily	28	30	175	175

As discussed in Section III of the Fact Sheet, Ecology developed a TMDL for BOD<sub>5</sub> and ammonia throughout the Puyallup River basin and tributaries effective May 1 through October 31. The maximum loadings established for this river

basin were set at 20,322 lb/day of BOD<sub>5</sub> and 3,350 lb/day of ammonia as nitrogen. This includes an unallocated reserve capacity of 3,670 lb/day of BOD<sub>5</sub> and 1,200 lb/day of ammonia. WLAs established for the Microchip discharge are 175 lb/day of BOD<sub>5</sub> and 240 lb/day of ammonia as nitrogen. Additionally, MASCA committed to not increase average monthly BOD<sub>5</sub> and Ammonia loadings beyond 88 lb/day and 147 lb/day, respectively.

The TMDL also provides an option for dischargers allowing them to reduce the WLA for ammonia and increase in the WLA for BOD<sub>5</sub>, since both parameters together influence dissolved oxygen. For each pound of ammonia reduction, the WLA for BOD<sub>5</sub> may increase by 13.4 lb/day. The net effect of this change in the allocation is considered negligible. In addition, a mediation settlement on May 29, 1998, established a process for allocation of the reserve capacity. Microchip has not requested access to the reserve nor has it proposed trading (internally) BOD<sub>5</sub> and Ammonia loading.

#### B. Total Suspended Solids

The draft permit contains performance-based limits that reduce the maximum daily limit from 30 mg/l to 23 mg/l and the average monthly limit from 15 mg/l to 11 mg/l (Table C-6). The draft load limits are calculated using the design flow (1.88 MGD) and the respective effluent limit.<sup>3</sup>

Table C-6: TSS Draft Limits				
	Concentration (mg/l)		Loading (lb/day)	
	Draft	Existing	Draft	Existing
Average Monthly	11	15	172	88-200
Maximum Daily	23	30	360	175-400

#### C. Total Ammonia (as N)

The draft permit contains water-quality based limits that reduce the maximum daily limit from 30 mg/l to 12 mg/l and the average monthly limit from 15 mg/l to 6 mg/l (Table C-7). The permit retains the existing mass limits. The mass limits are based upon a TMDL (maximum load) and MASCA's commitment to not increase loadings (average load).

<sup>3</sup> The calculation is: Load limit = Effluent limit (mg/l) x Flow (mg/d) x 8.34.

Table C-7: Ammonia Draft Limits				
	Concentration (mg/l)		Loading (lb/day)	
	Draft	Existing	Draft	Existing
Average Monthly	6	15	147	147
Maximum Daily	12	30	240	240

Low concentrations of ammonia can be toxic to freshwater fish, particularly salmonids. Un-ionized ammonia ( $\text{NH}_3$ ) is the principal toxic form of ammonia. The ammonium ion ( $\text{NH}_4^+$ ) is much less toxic. The relative percentages of these two forms of ammonia in the water vary as the temperature and pH vary. As the pH and temperature increase, the percentage of ammonia that is in the un-ionized form increases, causing increased toxicity.

Because the toxicity of ammonia is dependent upon pH and temperature, the criteria are also pH and temperature dependent. Using a temperature of 15.7 °C and pH of 7.9 to represent reasonable worst-case conditions, the acute and chronic ammonia criteria are 6.7 and 1.5 mg/l, respectively.

Although it is the un-ionized form that is toxic, the criteria are expressed as total ammonia. As effluent mixes with receiving water, the temperature and pH change, making it difficult to predict how much of the total ammonia in the discharge will convert to the un-ionized form. Therefore, the limits in the draft permit are expressed as total ammonia, not un-ionized ammonia.

In addition to potential toxicity, ammonia can contribute to dissolved oxygen depression. As discussed in Section IV.A above, Ecology developed a TMDL for ammonia and  $\text{BOD}_5$  to address dissolved oxygen concerns in the Puyallup River. The TMDL established a WLA for ammonia for Microchip and allowed conversion of ammonia loading into  $\text{BOD}_5$ . Based on the TMDL, the draft permit contains a daily maximum limit on ammonia loading of 240 lb/day. The average monthly limit is based upon MASCA's commitment to not increase loadings.

#### D. Temperature

The draft permit includes water quality based effluent limits for temperature because there was the reasonable potential to exceed the incremental temperature increase criteria. A mixing zone was utilized to determine the reasonable potential to exceed the Tribe's water quality criteria (See Section

4.2.c.iv). The criteria states that temperature shall not exceed 18°C due to human activities and that incremental temperature increases resulting from point source activities shall not, at any time, exceed  $t=28/(T+7)$  where “t” represents the maximum permissible temperature increase measured at a mixing zone boundary and “T” represents the background temperature as measured at a point or points unaffected by the discharge and representative of the highest ambient water temperature in the vicinity of the discharge. Effluent limits were developed based on Chapter 5.4.4 of EPA’s TSD.

#### E. Arsenic

The draft permit includes human health based effluent limits because there was the reasonable potential to exceed this criterion. A mixing zone was not available when determining the reasonable potential for the human health criteria because the background levels of arsenic exceed the criteria and dilution is not available. Effluent limits were developed based on Chapter 5.4.4 of EPA’s TSD. The TSD recommends setting the average monthly limit equal to the human health waste load allocation. The TSD also recommends calculating the maximum daily limit based on effluent variability, the number of samples taken per month, and a multiplier (found in Table 5.3). Therefore, the average monthly limit is 0.018 µg/L and the maximum daily limit is calculated as 0.05 µg/L.

#### F. Mercury

The effluent data presents contradictory information on the reasonable potential to violate effluent limits. On one hand, during the short period of operations before shut down when suitable analytical results exist, there were no violations of effluent limits. Additionally, reasonable potential analysis suggests no potential to violated receiving water standards using data from that period.

However, violations of effluent limits occurred after shut down during low volume batch dischargers. The new owner feels it has corrected the problem through the purchase of higher grade chemicals and through cleaning the treatment plant where concentrations of mercury formed in filters and the tightline.

The permit adopts the following approach to mercury.

First, the draft permit sets a maximum daily limit of 80 ng/l based on the previous effluent limit. This limit shall apply from the effective date of the permit to six (6) months from the effective date of the permit. Beginning the seventh (7<sup>th</sup>) month from the effective date of the permit a maximum daily limit of 49 ng/l shall apply consistent with the Puyallup Tribe's water quality standards.

Second, the permit contains a sunset provision for mercury. The limit will automatically sunset if:

- Microchip does not violate the 49 ng/l (maximum daily limit) for 24 months, beginning seven (7) months from the effective date of the permit
- Microchip meets an average monthly effluent limit of 12 ng/l from 19 months from the effective date of the permit to 30 months from the effective date of the permit, with samples taken twice weekly.
- Microchip maintains a average monthly production level that is a minimum of 0.6 MGD from the seventh (7<sup>th</sup>) month from the effective date of the permit to the 30<sup>th</sup> month from the effective date of the permit (i.e., the 24-month performance evaluation period). This flow represents MASCA's average production flow before decommission.
- Microchip develops and implements a mercury pollution prevention program.

In the event that the sunset provisions for mercury are met, Microchip shall certify that chemical reagents used to operate the Puyallup facility do not contain mercury at concentrations likely to exceed tribal water quality criteria.

#### G. Total Residual Chlorine

The draft permit contains water quality-based limits that reduce the maximum daily limit from 50 µg/l to 34 µg/l, and establishes an average monthly limit, 17 µg/l (Table C-8).

Table C-8: TRCL Draft Limits				
	Concentration (µg/l)		Loading (lb/day)	
	Draft	Existing	Draft	Existing
Average Monthly	17	---	---	---
Maximum Daily	34	50	---	---

#### H. pH

EPA analyzed the pH in the City of Puyallup's discharge needed to meet tribal water quality standards outside of the mixing zone and determined that a pH in the range of 6.2 to 9 s.u. would prevent exceedences of the Tribe's pH standard.

Because mixing characteristics are the same for the two discharges, we have not duplicated the analysis but recommend the same range for the Microchip discharge.

#### I. Total Toxic Organics

At a minimum, NPDES permits must include the technology-based limits found in 40 CFR 469. This includes the maximum daily and average monthly limits found in Table C-1. Because previous effluent monitoring of TTOs has been so far below these limits, EPA is requiring the minimum effluent monitoring (annual) applicable under the CWA.

## APPENDIX D - SAMPLE EFFLUENT LIMIT CALCULATIONS FOR AMMONIA

### Step 1: Determine the appropriate criteria

#### 1A. Determine the uses

The Puyallup River is protected by the Puyallup Tribe for the following uses: domestic, industrial and agricultural water supply, stock watering, fish and shellfish (including salmonids, crustaceans and other shellfish, and other fish), wildlife habitat, ceremonial and religious water use, commerce, navigation, and primary and secondary recreation.

#### 1B. Determine the most stringent criterion to protect the uses

The most stringent criterion associated with these uses is for protection of salmonid spawning. The criteria for ammonia are based on temperature and pH (see Appendix C, section IV.D). Using reasonable worst-case assumptions of 7.9 standard units for pH and 15.7°C for temperature, the acute criterion (CMC) and chronic criterion (CCC) corresponding to this level of protection are 6.7 mg/l as a one-hour average and 1.5 mg/l as a four-day average, respectively.

### Step 2: Determine whether there is “reasonable potential” to exceed the criteria

#### 2A. Determine the “reasonable potential” multiplier

The “reasonable potential” multiplier is based on the CV of the data and the number of data points. In this case, there are 54 data points, with a CV of 0.58. Using the equations in section 3.3.2. of the TSD, the reasonable potential multiplier (RPM) is calculated as follows:

$$p_n = (1 - \text{confidence level})^{1/n}$$

where,

$p_n$  = the percentile represented by the highest concentration

$n$  = the number of samples

$$p_n = (1 - 0.99)^{1/54}$$

$$p_n = 92$$

This means that the largest value in the data set is greater than the 92<sup>nd</sup> percentile.

Next, the ratio of the 99<sup>th</sup> percentile to the 92<sup>nd</sup> percentile is calculated, based on the equation:

$$C_p = \exp(z\sigma - 0.5\sigma^2)$$

where,

$$\sigma^2 = \ln(CV^2 + 1)$$

CV= coefficient of variation (= 0.58)

$$\sigma^2 = 0.29$$

z = normal distribution value

= 2.326 for the 99<sup>th</sup> percentile

= 1.405 for the 92<sup>nd</sup> percentile

$$C_{99} = \exp(2.326 \cdot 0.54 - 0.5 \cdot 0.29)$$

$$= 3.04$$

$$C_{92} = \exp(1.405 \cdot 0.54 - 0.5 \cdot 0.29)$$

$$= 1.85$$

$$RPM = C_{99}/C_{92}$$

$$= 3.03/1.85$$

$$\mathbf{RPM = 1.64}$$

2B. Calculate the concentration of the pollutant at the edge of the mixing zone

There is reasonable potential to exceed criteria if the maximum projected concentration of the pollutant at the edge of the mixing zone exceeds the criterion. The maximum projected concentration is calculated from the following equation:

$$C_d = \frac{C_e - C_u}{D} + C_u$$

where,

C<sub>d</sub>= receiving water concentration at the edge of the mixing zone

C<sub>e</sub>= maximum projected effluent concentration

$C_d$  = maximum reported effluent concentration \* reasonable potential multiplier (26\*1.6 = 42 mg/l)  
 $C_u$  = upstream concentration of pollutant (0.05 mg/l)  
 $D$  = dilution factor (1.8 for acute, 11.5 for chronic)

For the acute criterion,

$$C_d = \frac{42 - 0.05}{1.8} + 0.05$$

$$C_d = 24 \text{ mg/l}$$

For the chronic criterion,

$$C_d = \frac{42 - 0.05}{11.5} + 0.05$$

$$C_d = 4 \text{ mg/l}$$

The concentrations at the edges of the acute and chronic mixing zones are greater than the criteria, therefore a limit must be included in the permit.

### Step 3: Calculate the wasteload allocations

Wasteload allocations (WLAs) are calculated using the same mass balance equation used to calculate the concentration of the pollutant at the edge of the mixing zone. However,  $C_d$  becomes the acute or chronic criterion and  $C_e$  is replaced by the acute or chronic WLA. The equation is rearranged to solve for the WLA, becoming:

$$WLA_a = D(CMC - C_u) + C_u$$

For the acute criterion

$$WLA_a = 1.8 * (6.7 - 0.05) + 0.05$$

$$WLA_a = 12 \text{ mg/l}$$

For the chronic criterion

$$WLA_c = 11.5 * (1.5 - 0.05) + 0.05$$

$$\mathbf{WLA_c = 17 \text{ mg/l}}$$

The WLAs are converted to long-term average concentrations, using the following equations from EPA's *Technical Support Document for Water Quality-based Toxics Control* (TSD):

$$LTA_a = WLA_a * \exp[0.5\sigma^2 - z\sigma]$$

$$LTA_c = WLA_c * \exp[0.5\sigma_4^2 - z\sigma_4]$$

where,

$$\sigma^2 = \ln(CV^2 + 1) \quad (\text{CV assumed equal to 0.6 for this calculation})$$

$$\sigma^2 = 0.31$$

$$\sigma_4^2 = \ln(CV^2/4 + 1)$$

$$\sigma_4^2 = 0.086$$

$$z = 2.326 \text{ for } 99^{\text{th}} \text{ percentile probability basis}$$

$$LTA_a = 12 * \exp[0.5 * 0.31 - 2.326 * 0.55]$$

$$\mathbf{LTA_a = 4 \text{ mg/l}}$$

$$LTA_c = 17 * \exp[0.5 * 0.086 - 2.326 * 0.29]$$

$$\mathbf{LTA_c = 9 \text{ mg/l}}$$

The LTAs are compared and the more stringent is used to develop the daily maximum and monthly average permit limits. In this case, the acute LTA is more stringent.

Step 4: Derive the maximum daily (MDL) and average monthly (AML) permit limits

Using the TSD equations, the MDL and AML permit limits are calculated as follows:

$$MDL = LTA * \exp[z\sigma - 0.5\sigma^2]$$

where:

$z = 2.326$  for 99<sup>th</sup> percentile probability basis

$$MDL = 4 * \exp[2.326 * 0.55 - 0.5 * 0.31]$$

$$\mathbf{MDL = 12 \text{ mg/l}}$$

$$AML = LTA * \exp[z\sigma_n - 0.5\sigma_n^2]$$

where:

$$\sigma_n^2 = \ln(CV^2/n + 1)$$

$z = 1.645$  for 95<sup>th</sup> percentile probability basis

$n$  = number of sampling events required per month (4)

$$AML = 4 * \exp[1.645 * 0.29 - 0.5 * 0.086]$$

$$\mathbf{AML = 6 \text{ mg/l}}$$

## **APPENDIX E – DRAFT CERTIFICATION UNDER 401 OF THE CLEAN WATER ACT FOR MICROCHIP TECHNOLOGY INCORPORATED INC.**

As required under section 401 of the Clean Water Act, the Puyallup Tribe of Indians has been requested by EPA to certify that the wastewater discharged from Microchip Technology Incorporated will comply with the Water Quality Standards for Surface Waters of the Puyallup Tribe. Region X EPA is proposing to issue an National Pollutant Discharge Elimination System (NPDES) permit (WA-003957-8) to Microchip Technology Incorporated, authorizing the discharge of wastewater from a wastewater treatment facility located in the City of Puyallup to the Puyallup River at latitude 47° 12' 25" N, longitude 122° 19' 15" W.

This certification is based on and relies upon information contained in draft NPDES permit WA-003957-8 and the Engineering Report for Microchip Technology Incorporated (October 2001). The Engineering Report details maximum daily design flows of the facility, operational processes and wastewater streams, and wastewater treatment plant improvements. This certification also assumes plant start-up upon the effective date of the permit.

Upon review of draft NPDES permit (WA-003957-8), the Puyallup Tribe of Indians is granting certification under section 401 of the Clean Water Act that there is reasonable assurance that the proposed activity and resulting discharge is in compliance with requirements of the Clean Water Act and Water Quality Standards for Surface Waters of the Puyallup Tribe provided that the following conditions are satisfied:

1. A mixing zone pursuant to section 9 of the Tribe's Water Quality Standards is authorized for ammonia, total residual chlorine, mercury, and temperature provided that the permittee monitor annually during critical conditions at the edge of the mixing zone to demonstrate attainment of water quality criteria. A Quality Assurance Project Plan shall be submitted to the Tribe's Environmental Protection Department for review and approval prior to sampling.
2. Fluoride study – If process chemicals that contain fluoride are used at the Microchip facility, a fluoride toxicity study shall be conducted to ensure compliance with Section 5(1) of the Water Quality Standards for Surface Waters of the Puyallup Tribe. Section 5(1) of the Tribe's Water Quality Standards state "Toxic substances shall not be introduced above natural background levels in surface waters of the Puyallup tribe which have the potential either singularly or cumulatively to adversely affect characteristic uses, cause acute or chronic conditions to the most sensitive biota dependent on those waters, or adversely affect public health, as determined by the Department." The study's scope and

methods shall be approved by the Department within the first 6 months of the effective date of the permit, prior to commencing the study.

Or

Microchip shall commence a feasibility study within the first 6 months of the effective date of the permit to assess the alternate use of process chemicals that don't contain fluoride as a by-product in the chip manufacturing process. A report on the feasibility of alternate chemical use shall be submitted to the Tribe's Environmental Protection Department by the 12<sup>th</sup> month from the effective date of the permit. The feasibility report shall be reviewed and approved by the Tribe prior to implementation.

3. Mercury – Eliminating the mercury limitation after the 30<sup>th</sup> month from the effective date of the permit is contingent upon 100% compliance. Upon sunset of the mercury limit, Microchip shall certify that chemical reagents used to operate the Puyallup facility do not contain mercury at concentrations likely to exceed tribal water quality criteria end-of-pipe.
4. Temperature – The Tribe grants Microchip a compliance schedule of 3 years from the effective date of the permit to meet daily and monthly temperature effluent limits presented in Table 1 of the draft permit. Until compliance is achieved, Microchip shall, at a minimum, complete the following tasks:
  - a. By the 12<sup>th</sup> month of the effective date of the permit, complete an assessment analyzing methods to reduce effluent temperatures;
  - b. By the 24<sup>th</sup> month of the effective date of the permit, select alternatives or measures to reduce plant effluent temperatures. Notify Tribe, EPA, and Ecology in writing of selected method(s).
  - c. By the 36<sup>th</sup> month of the effective date of the permit, Microchip shall complete and fully implement facility improvements to meet daily and monthly temperature limits.
5. Microchip shall develop pollution prevention plans for arsenic and mercury, and a solvent management plan for total toxic organic compounds. These plans shall be submitted to the Tribe's Environmental Protection Department by the 18<sup>th</sup> month from the effective date of the permit and approved prior to implementation.
6. Discharge monitoring reports (DMRs) shall be submitted to the Tribe's

Environmental Protection Department. DMRs shall include laboratory analytical results and a summary of the data with respect to effluent limits, complete with data qualifiers (as necessary).

7. A copy of the Wastewater Treatment System Operating Plan shall be submitted to the Tribe's Environmental Protection Department.
8. Transfer - Microchip shall notify the Tribe's Environmental Protection Department at least 30 days in advance of the proposed transfer date.